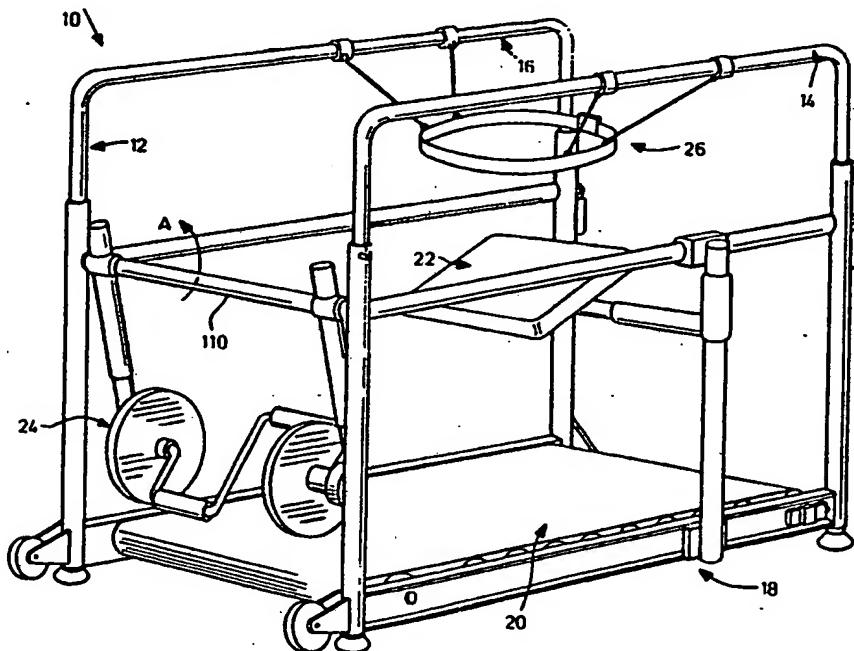




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(54) Title: EXERCISING DEVICE



(57) Abstract

A self-contained exercising device (10) having an adjustable frame (12) comprising frame sections (14, 16) which extend upward from a treadmill (20) and which is open in the rear area to provide access for a patient. A seat (22) is coupled to the central portion of one of the frame portions and a limb exercising device (24) is coupled to the front portion of the frame structure.

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TITLE: EXERCISING DEVICE

The invention relates to exercising devices.

The increasing population of geriatric care facilities has increased the awareness of the need for providing physical exercise to the handicapped and other geriatric patients.

Exercising devices generally available in the form of treadmills have been found to be particularly beneficial in maintaining good cardiovascular fitness. However, such treadmill devices have been considered dangerous for use by patients due to the risk of their slipping on or falling from the device. In addition, the frame-like structure which is commonly seen in these treadmills act as a further source of injury.

Other exercising devices are available and are particularly directed to geriatric patients. For example, there is a device utilizing a "bike pedal" configuration, which is fastened to the legs of the patients chair, such that the patient may exercise his legs in a motion analogue to riding a bicycle. However, such devices restrict the patient to one mode of exercise only.

Accordingly, it would be desirable to provide an exercising device which not only incorporates the beneficial effects of the treadmill but also provides the possibility of several modes of exercise to geriatric patients.

Accordingly, it is the object of the present invention to provide a novel form of exercising device.

Briefly stated the invention comprises a self-contained exercising apparatus, comprising:

a base including a treadmill;

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a frame structure having first and second frame portions upwardly extending from the longitudinal edges of the treadmill;

a limb exercising device coupled to the front portion of the frame structure and positionable above the treadmill; and

a seat coupled to the central portion of the frame structure, the seat being orientable to a position adjacent the treadmill and the limb exercising device so as to provide support to the user during use of the treadmill or the limb exercising device.

Further features, objects and advantages of the present invention will be evident from the following detailed description, given by way of example only, with reference to the appended drawings in which:

Figure 1 is a perspective view of an exercising device.

Figure 2 is a side view of the exercising device illustrated in Figure 1.

Figure 3 is a rear view of the exercising device illustrated in Figure 1.

Figure 4 is a sectional view taken on line 4-4 of Figure 2.

Figure 5 is a sectional view taken on line 5-5 of Figure 2.

Figure 6 is a perspective view of a portion of an alternative exercising device.

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Figure 7 is a perspective view of another element of an alternative exercising device.

Figure 8 is a frontal view of a portion of the element shown in Figure 7.

Referring now to Figure 1, the exercising device 10 has an adjustable frame 12 formed from left and right frame sections 14, 16 respectively. The frame sections 14, 16 upwardly extend from a base 18, which is defined by a treadmill 20, and is open in the rear area to provide access for the patient to the treadmill. A seat 22 is provided in the central region of the frame and is swingable to a stored position along the frame 12. In addition, a limb exerciser 24 is pivotally mounted to the front section of the frame 12. The exerciser is further provided with a harness 26 to provide support to the patient.

Referring now to Figures 2 and 3, each of the left and right frame sections 14, 16 has a lower part formed from a front and rear vertical members 28, 30 respectively with a horizontal member 32 spanning the area between the vertical members 28, 30. The vertical members 28, 30 are further fastened at their lower ends to a channel member 34. The frame also has footings 36 to provide a solid base to accommodate any structural variations in the frame 12 or irregularities on the floor surface identified at 38.

The device is a portable by way of rollers 40 forwardly extending from the front vertical members 28. In addition, handles 42 are pivotally mounted to the rear vertical members 30, enabling the device to be lifted, thereby transferring the device 10 from the footings 36 to the rollers 40.

The upper ends 28a, 30a of the front and rear vertical members respectively are open to receive the parallel

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ends 44a of a handle bar 44 slidably inserted therein. The bar 44 is made adjustable within the upper ends 28a, 30a by way of a number of threaded bores 44b formed longitudinally on the ends 44a and co-axial with bores 28b, 30b located in the vertical members 38, 40 respectively to receive adjustment pins 46.

The seat 22 is mounted on a seat frame 48 having a vertical seat member 50 joining the channel member 34 with the horizontal member 32 by brackets 52 and 54 respectively. A sleeve 56 is slidable and rotatable on the vertical seat member 50 and is joined to the outer element 58 of a pair of telescoping elements. The inner element 60 has a seat bracket 62 mounted thereon, with the seat 22 connected to the bracket by way of a number of projections 64 depending from the bottom surface of the seat 22. The brackets 62 and projections 64 also have co-axial bores 62a, 64a respectively to receive a pair of pins 66. In addition, a releasable pin 57 is provided in sleeve 56 to extend through bore 56a and bores 50a or 50b to maintain the sleeve alternatively in an operable position shown in solid lines or a stored position shown in dashed lines in Figure 2.

Alternatively, the sleeve 56 may be adjustably mounted on the vertical seat member 50 to accommodate patients with a range of different leg lengths.

The channel members 34 also provide support for the rollers 68 of the treadmill 20, which are spaced along and rollable with respect to the channel members 34. A continuous belt 70 travels along the periphery of the rollers 68 and have longitudinal travelling limits defined by a pair of front and rear anchor rollers 72, 74 respectively. The rear roller 74 is supported on a roller frame 74a to adjust belt tension. This is provided by a bolt 74b extending through the rear vertical member 30 and being threadably engaged with the roller frame

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74a, such that rotation of the bolt 74b results in the axis of the roller 74 being displaced along the channel member 34.

The front roller 72 has a brake assembly 76 to provide resistance against motion of the belt 70. As seen in Figure 4, the brake assembly 76 has an adjustment handle 78 threaded to a flange portion 80, which in turn is bolted to a brake housing 82 by bolts 84. The brake housing 82 is also mounted to a plate member 86, with the plate member 86 being bolted to the channel member 34 by bolts 88. A compression spring 90 is interposed of the handle 78 and a first brake disc 92. A second brake disc 94 is interposed of the first brake disc 92 and the brake housing 82, with brake pads 96, 98 defined between the contacting surfaces between the respective brake discs 92, 94 and the brake housing 82. The second brake disc 94 is keyed to a shaft 100, with the shaft fixed to the roller 72 by way of a key 102 and supported on a bearing 104 mounted in the channel by bolts 106. In this manner, rotation of the handle 78 increases the compressive force against the second brake disc 94, which results in an increased resistance to rotation being applied to the roller 72.

The limb exerciser 24 is pivotally mounted on the front vertical members 28 by a support structure 108 having a cross member 110 extending between the front vertical members 28. As seen in Figure 4, each end of the cross member is formed by a shaft 112 extending through bores 28c in the vertical member 28. A one-way ratchet 114 mechanism couples the shaft with the vertical member to provide rotation of the cross member in one direction as identified by arrow "A".

Referring to Figure 3, a boss 116 is mounted on each end of the cross member, to which laterally extends the outer tube 118 of a pair of telescoping tubes. The inner tube 120 extends outwardly from the inner tube and has a remote end 120a provided with a transverse passage 120b. The passage receives

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a shaft portion 122 of a crank assembly 124, rotatable therein by way of bushings 126.

The crank mechanism has a pair of cranks 124a, 124b joined in tandem along the common axis defined by the shaft portions 122. The crank mechanism 124 also has a pair of fly wheels 126 to assist the user in obtaining a steady rotation of the cranks 124a, 124b. The crank mechanism 124 also includes a pair of brake assemblies 128, having the same structural characteristic as brake assembly 76, including a handle 130 to provide adjustable resistance to rotation.

The pivotal connection of the limb exerciser 24 with the frame 12 enables the limb exerciser 24 to be rotated to any one of a number of positions, some being indicated at "B", "C" and "D" shown in Figure 2. In this manner, the limb exerciser 24 is workable by both the feet and the hands. Also, the rotational capability of the limb exerciser support structure 108 and the extensible capability of the telescoping tubes 118, 120 enables the exerciser to accommodate a number of users with different body sizes. The seat also aids to this body size accommodation while providing support to the patient during use of both the treadmill and the limb exerciser.

Support of the patient is also assisted by way of the harness 26 coupled to the handle bars 44. The harness 26 has a belt 134 with a rearwardly located buckle 134a, and four elastic straps 136 coupled to the belt and the handle bars by brackets 138, 140 respectively.

In this manner, the belt 134 may be attached to the central region of the user while the elastic straps 136 enable the user to generate the exercising device in either of a standing or seated position.

In operating the device, the user enters the device from the rear access between the rear vertical members 30. The

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seat may then be moved from the stored position to the operable position and the limb exercising device 24 rotated to either an arm exercising position or a leg exercising position.

The user may then attach the belt around his waist area to receive added support, for his subsequent exercising activity, involving the treadmill 20 and the limb exerciser 24.

In operating the treadmill 20, the belt 70 is displaced along the rollers 68, by use of the legs and feet in a walking movement. The limb exerciser 24 may be operated simultaneously with the treadmill 20 by rotating the cranks 124a, 124b with the arms or alternatively by the feet. In this case, the cranks 124a, 124b may be provided with a harness to hold the feet against the cranks, for example a pair of releasable straps 125.

An alternative embodiment is shown in Figure 6 wherein an arm rest assembly 150 is removably mounted to the handle bars 44 by way of brackets 152 each of which is releasable by way of knobs 152a which hold hinged portion 152b against the lower surface of handle bar 44. Upwardly extending from the brackets 152 are tubular members 154 which terminate at a "U"-shaped member 156. Mounted on the rear top surface of the "U"-shaped member 156 are arm pads 158, each to receive a lower arm region of the user. Mounted upwardly on the "U"-shaped member in front to the arm pad 158 are handle grips 160 providing the user with additional support.

In addition, the front region 156a of the "U"-shaped member 156 acts as a further protective abutment and may be covered with a pad as shown at 161, to protect against injuries caused by bodily contact with the limb exerciser 24.

A further alternative is shown in Figures 7 and 8, wherein the exercising device 10 is provided with a knee

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support 162 comprising a frame 163 mounting a cushion 164 in an angular upward orientation above the treadmill 20.

The support is mounted on one of the front vertical members 28 by way of a transverse passageway 166 formed therein. As may be seen in Figure 7, the frame 162 includes a shaft element 168 extending through the passageway 166 and fixed to a tubular element 170 at one end and a one-way ratchet mechanism 172 at the other by way of a key 173, the one-way ratchet mechanism being of the same type as one-way ratchet mechanism 114.

The tubular element 170 extends horizontally inward from the front vertical member 28 and having fixed at its remote end 170a, a transverse tubular element 174. The transverse tubular element 174 is telescopingly engaged with another tubular element 176, which outwardly extends from the tubular element 174 to terminate at a cushion bracket 178 pivotally mounted thereto by pivot pin 180, the cushion bracket 178 is pivotably adjustable on tubular element 176 by way of a release bolt 182 threaded in bore 176a therein, the release bolt 182 also located in arcuate slots 178a formed in bracket 178. In addition, tubular element 176 is releasably fixed in tubular element 174 by a release bolt 184 threaded in bore 174a and extending through slots 176b. Thus, the knee support 160 has multiple adjustments to accommodate a varied number of desired positions for the user.

Alternative arrangements are also considered for harness assembly 26 including six or more straps 136 to provide further support to the user. Also contemplated is the use of different types of straps 136 such that the front straps have a different spring constant than the rear straps, thereby providing easier flexibility of the harness in the one direction than in the other. For example, the use of a higher spring constant in the front pair of straps 134 enables the user to flex the harness 26 in the forward direction, while

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having reduced flexibility in the rearward direction, thereby preventing the user from contacting the frames 12 or the treadmill 20 and causing injury.

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CLAIMS

- 1) A self-contained exercising apparatus, comprising:
 - a base including a treadmill;
 - a frame structure having first and second frame portions upwardly extending from the longitudinal edges of said treadmill;
 - a limb exercising device coupled to the front portion of said frame structure; and
 - a seat coupled to the central portion of one of said frame portions.
- 2) An exercising device as defined in claim 1 wherein the seat is swingingly mounted to said one of said frame portions.
- 3) An exercising device as defined in claim 2, wherein the seat includes an extensible seat frame.
- 4) An exercising device as defined in claim 3 wherein said extensible seat frame includes a vertically adjustable frame portion.
- 5) An exercising device as defined in claim 5 wherein said vertically adjustable frame portion includes a substantially vertically oriented first elongate member with a sleeve member slidably engaged on the outer surface thereof, the seat being coupled with said sleeve member and including locking means for locking the sleeve member in a desired position.
- 6) An exercising device as defined in claim 5 wherein said extensible seat frame includes second and third elongate

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members, said second and third members being telescopingly engaged with the outer of said members being coupled to said sleeve member.

7) An exercising device as defined in claim 1 wherein a portion of the frame structure is vertically adjustable.

8) An exercising device as defined in claim 7 wherein each of the first and second frame portions include a first pair of upwardly oriented elongate elements, with which respectively slidably engage, a second pair of elongate elements.

9) An exercising device as defined in claim 8 wherein said first pair of elongate elements are substantially parallel and said second pair of elongate elements form the depending portions of a handle bar member.

10) An exercising device as defined in claim 1 wherein the limb exercising device is pivotally coupled in the front region of each of said first and second frame portions so as to provide adjustable orientation of the limb exercising device for alternate access by the hands and feet of the user.

11) An exercising device as defined in claim 10 wherein the limb exercising device includes a pair of extensible frame members.

12) An exercising device as defined in claim 11 wherein each of said extensible members is formed from first and second elongate elements with said first elongate element slidably telescopingly engaged with said second elongate element.

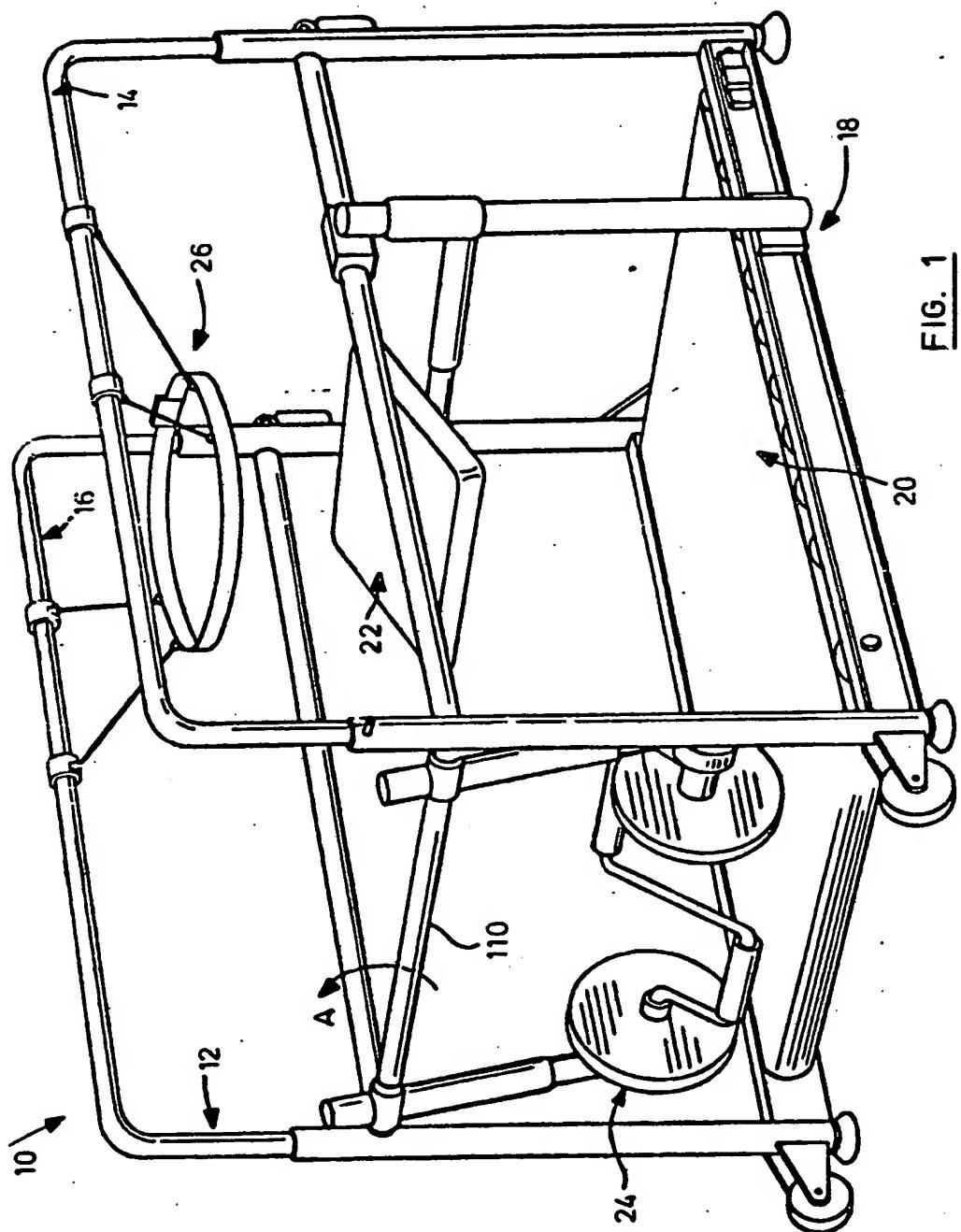
13) An exercising device as defined in claim 12 wherein the limb exercising device includes a crank mechanism having a crank rotatably coupled with said first elongate elements.

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- 14) An exercising device as defined in claim 13 wherein the crank mechanism includes braking means to apply resistance to rotation of the crank mechanism.
- 15) An exercising device as defined in claim 1, further comprising a harness assembly to support the user.
- 16) An exercising device as defined in claim 15 wherein the harness assembly includes a belt element wrappable around the central region of the user and coupled with said first and second frame portions so as to support the user in both a standing and a sitting position.
- 17) An exercising device as defined in claim 16 wherein said harness assembly includes a pair of extensible links joining said belt element with said first and second frame portions.
- 18) An exercising device as defined in claim 1 wherein the device is positioned on footings located in the corners of the base, a handle means is located at the rear of the first and second frame portions, rolling elements disposed in close proximity with the ground in the front region of the first and second frame portions, whereby rotation of the device relative to the rolling elements provides mobility to the device.
- 19) An exercising device as defined in claim 1 further comprising arm support means coupled with said first and second frame portions to support the arms of the user.
- 20) An exercising device as defined in claim 19 wherein said arm support means includes a support element having a pair of spaced arms oriented in a plane substantially parallel with said treadmill, with said arms extending along said first and second frame portions, said support element further including a spanning member joining the adjacent ends of said pair of arms.

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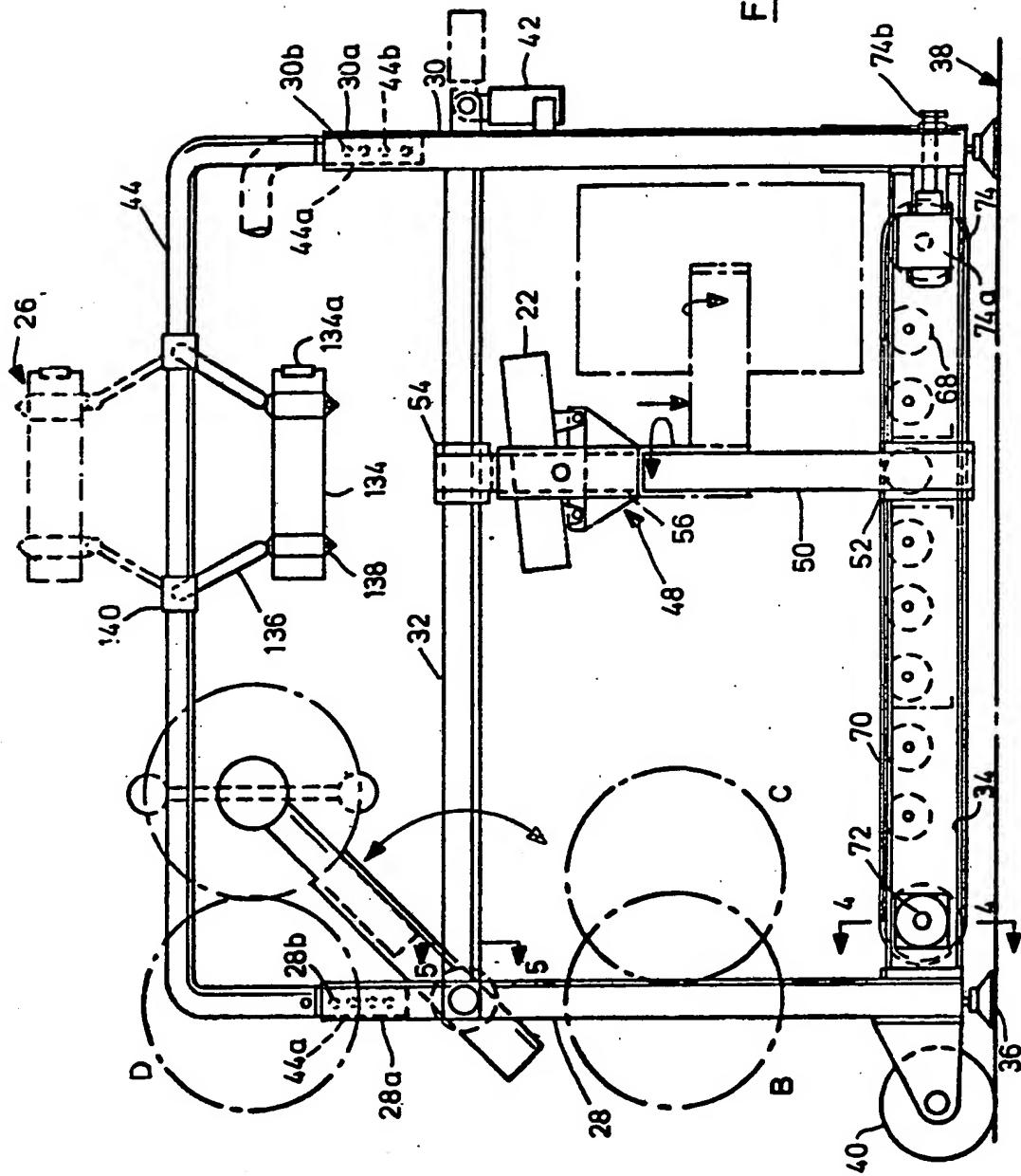
- 21) An exercising device as defined in claim 1 further comprising a knee support assembly adjustably mounted on one of said frame portions.
- 22) An exercising device as defined in claim 21 wherein said knee support assembly has a support structure pivotally mounted on one of said frame sections.
- 23) An exercising device as defined in claim 22 wherein said support structure includes a pair of telescoping members extending into the region between said first and second frame sections.
- 24) An exercising device as defined in claim 23 wherein said telescoping members are fixed to a third member, said third member coupled to said frame section by way of a ratchet mechanism.



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FIG. 2



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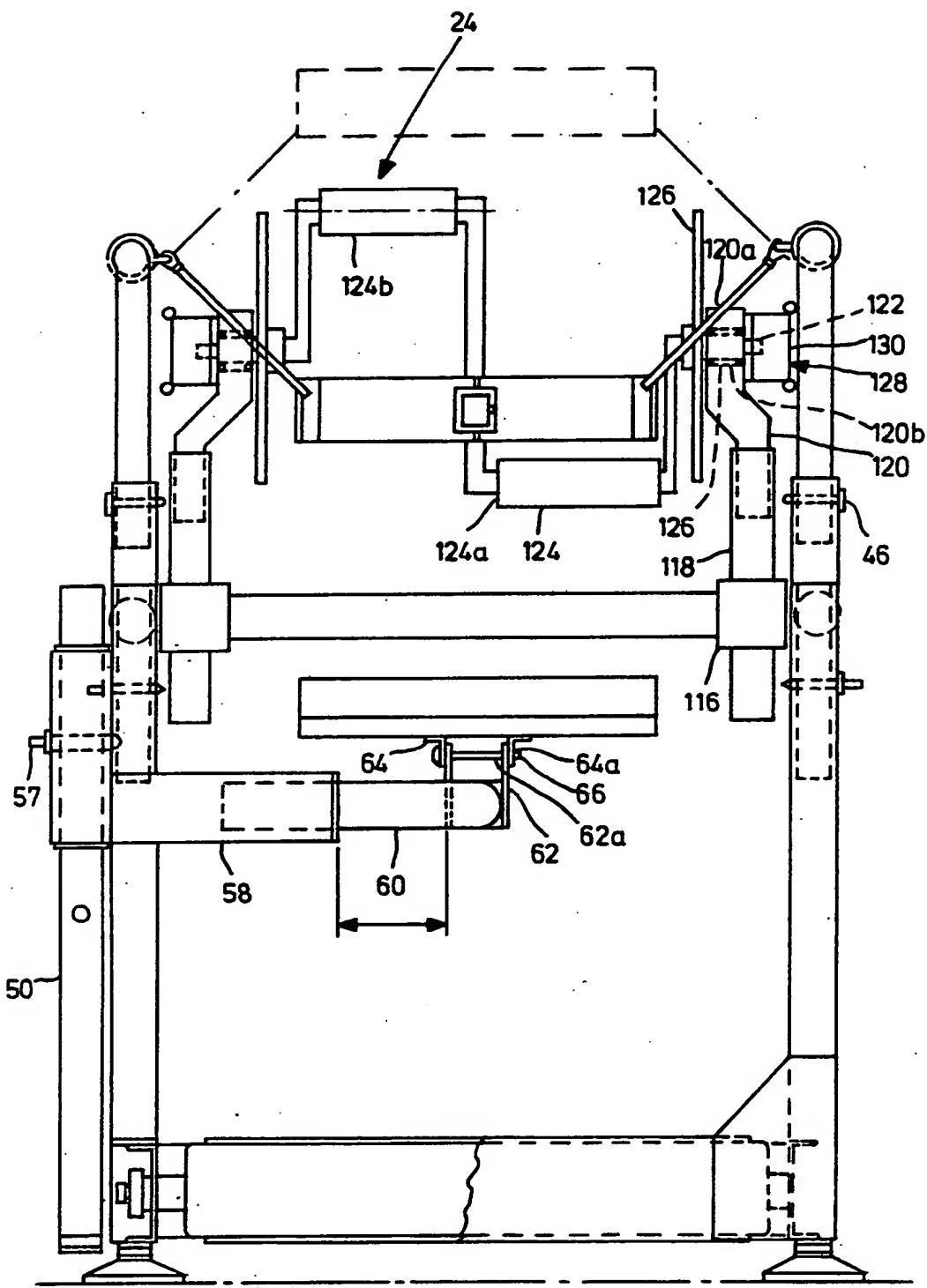


FIG. 3

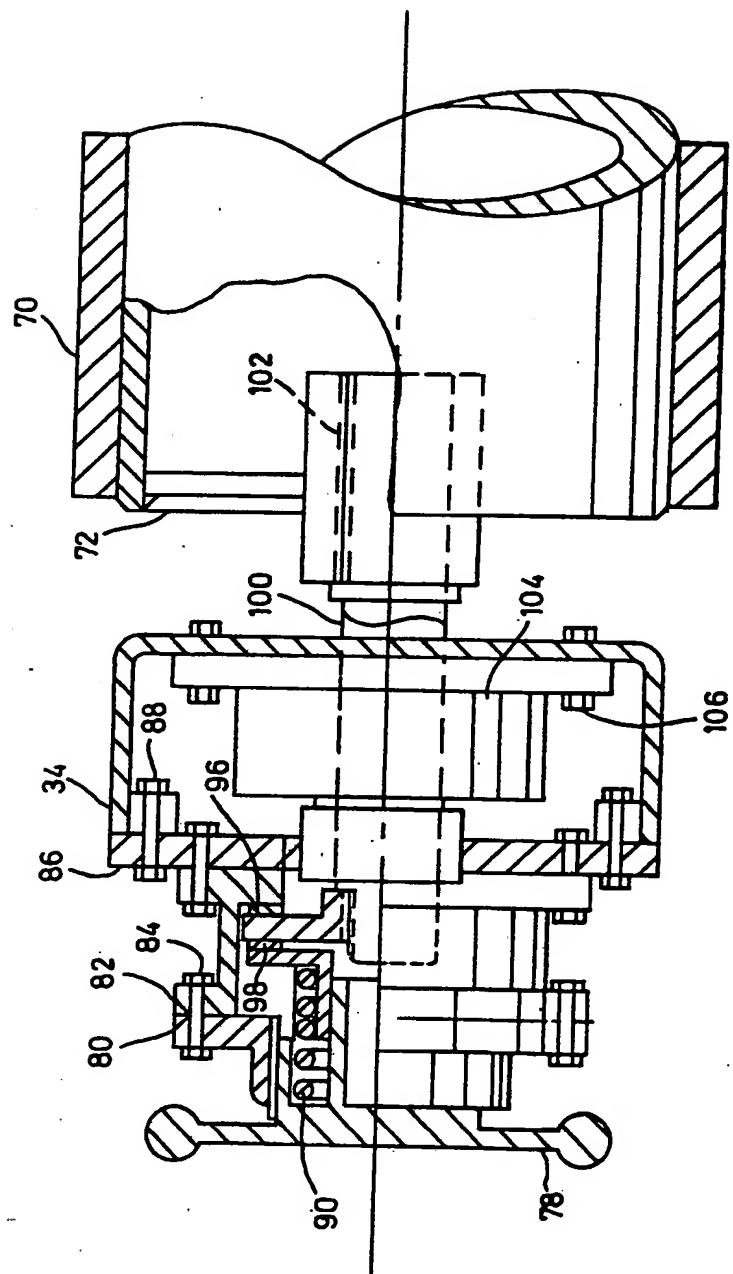


FIG. 4

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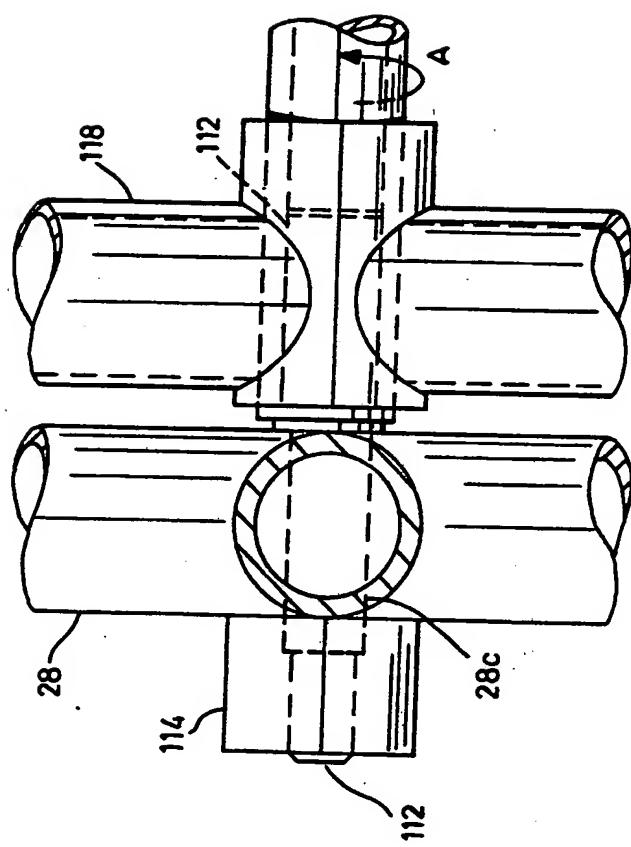


FIG. 5

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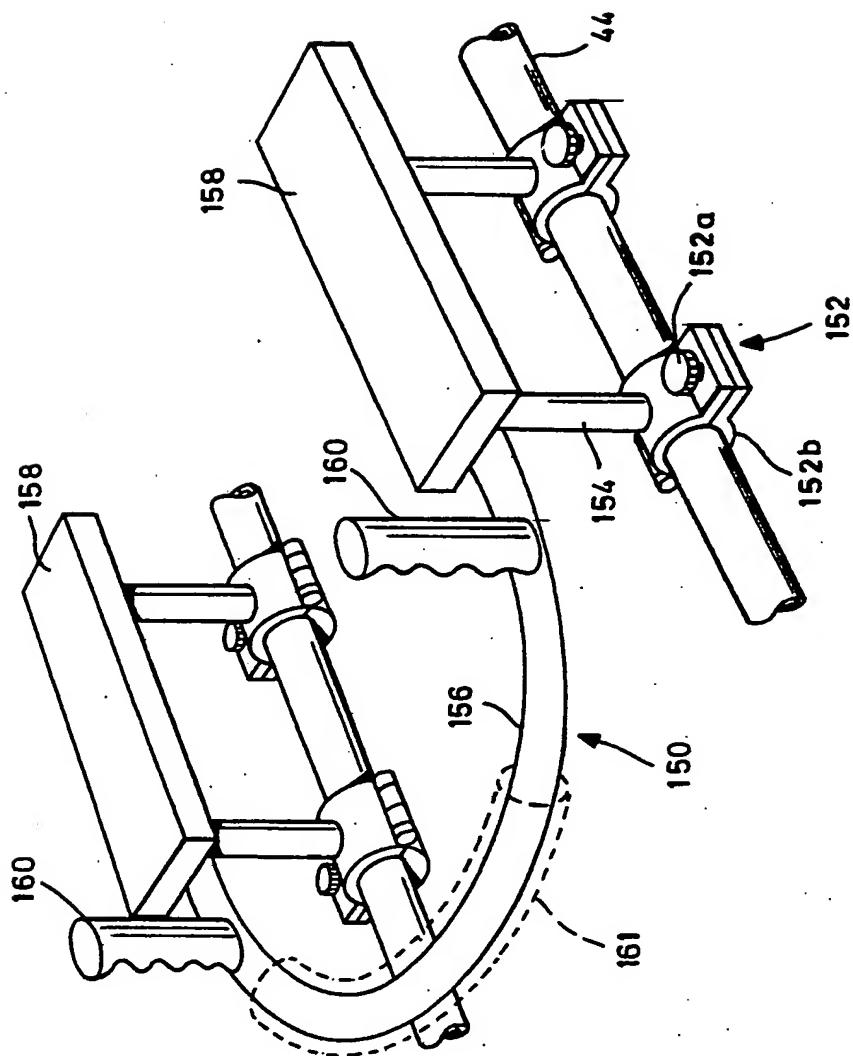


FIG. 6

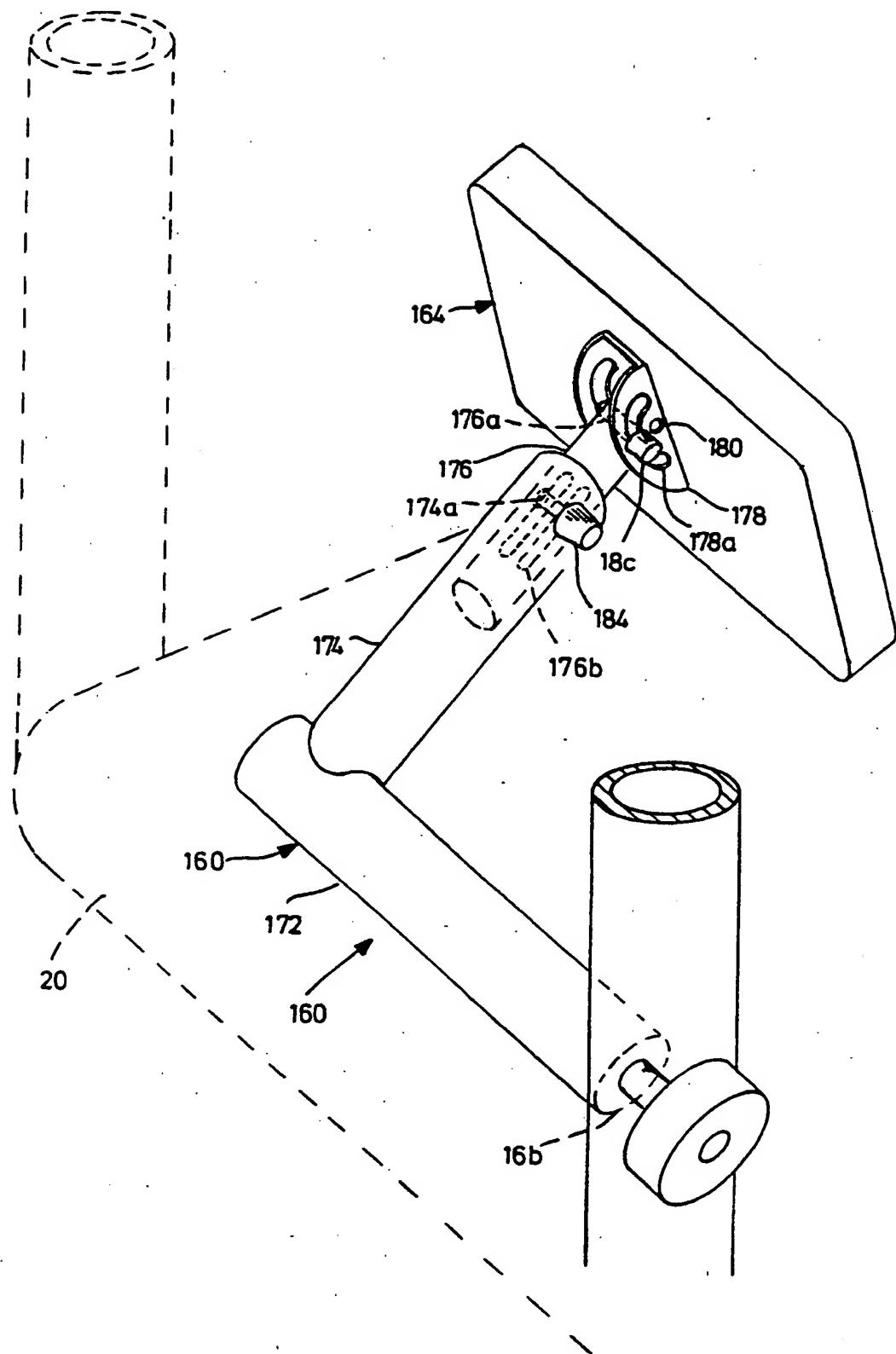


FIG. 7

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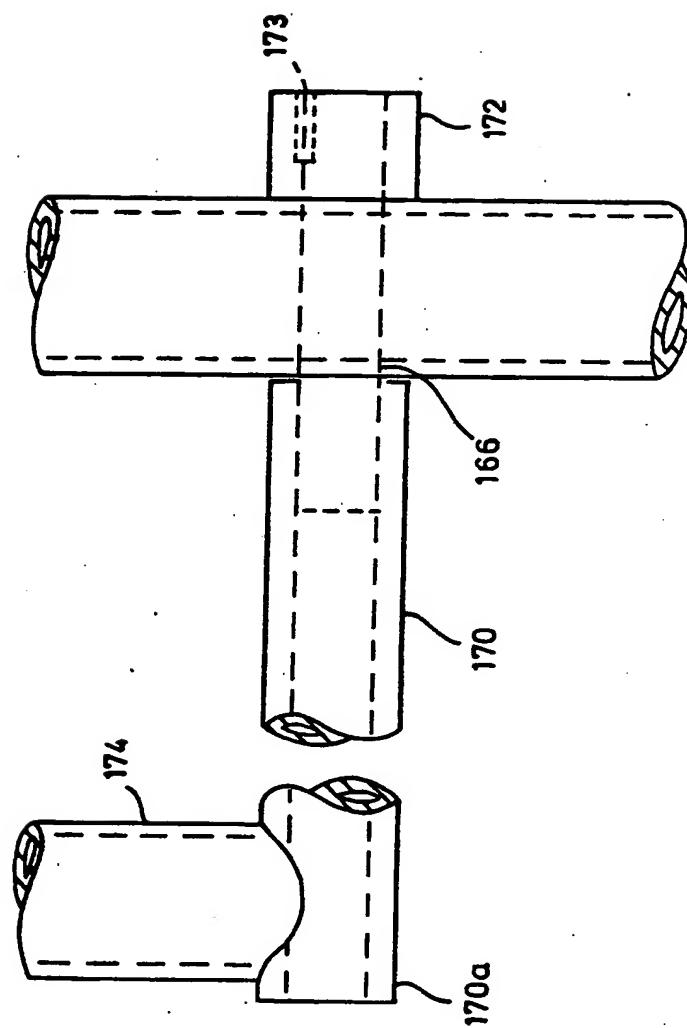


FIG. 8

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INTERNATIONAL SEARCH REPORT

International Application No PCT/US87/01734

I. CLASSIFICATION OF SUBJECT MATTER (If several classification symbols apply, indicate all) ³

According to International Patent Classification (IPC) or to both National Classification and IPC

IPC(4): A63B 23/06

U.S. Cl: 272/69

II. FIELDS SEARCHED

Minimum Documentation Searched ⁴

Classification System	Classification Symbols
U.S.	272/69, 70, 73 128/25R

Documentation Searched other than Minimum Documentation
to the Extent that such Documents are Included in the Fields Searched ⁵

III. DOCUMENTS CONSIDERED TO BE RELEVANT ¹⁴

Category ⁶	Citation of Document, ¹⁵ with indication, where appropriate, of the relevant passages ¹⁷	Relevant to Claim No. ¹⁸
A	US,A, 4,026,545 (SCHONENBERGER) 31 MAY 1977 See col. 1, lines 59-62; col. 2, lines 55-63	
A	US,A, 4,204,673 (SPEER, SR.) 27 MAY 1980 See col. 2, lines 40-44, 55-68; col. 3, lines 1-8	
A	US,A, 2,399,915 (DRAKE) 07 MAY 1946 See col. 3, lines 40-53; col. 4, lines 19-28; col. 5, lines 48-55	1,15-19
A	US,A, 3,870,297 (ELDER) 11 MARCH 1975 See col. 5, lines 8-65	
Y	CAN,A, 672583 (PRIMEAU) 22 OCTOBER 1963 See page 5, lines 22-28, page 6, lines 1-6	1,7,15,16,19
Y	US,A, 2,826,192 (MANGAS) 11 MARCH 1958 See col. 2, lines 50-53, lines 58-66	1,18,19

* Special categories of cited documents: ¹⁶

"A" document defining the general state of the art which is not considered to be of particular relevance

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"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search ⁸

01 OCTOBER 1987

Date of Mailing of this International Search Report ⁹

20 OCT 1987

International Searching Authority ¹

ISA/US

Signature of Authorized Officer ¹⁰

S.R. Crow

S.R. Crow

FURTHER INFORMATION CONTINUED FROM THE SECOND SHEET

A | US, A, 4,564,193 (STEWART) 14 JANUARY 1986
See the entire document

V. OBSERVATIONS WHERE CERTAIN CLAIMS WERE FOUND UNSEARCHABLE ¹⁰

This international search report has not been established in respect of certain claims under Article 17(2) (a) for the following reasons:

1. Claim numbers because they relate to subject matter ¹¹ not required to be searched by this Authority, namely:

2. Claim numbers because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out ¹², specifically:

VI. OBSERVATIONS WHERE UNITY OF INVENTION IS LACKING ¹³

This International Searching Authority found multiple inventions in this International application as follows:

1. As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims of the international application.

2. As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims of the International application for which fees were paid, specifically claims:

3. No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claim numbers:

4. As all searchable claims could be searched without effort justifying an additional fee, the International Searching Authority did not invite payment of any additional fee.

Remark on Protest

The additional search fees were accompanied by applicant's protest.
 No protest accompanied the payment of additional search fees.